REMARKS

Claims 3-4, 7-18 are pending. Claims 3-4 are amended herein. Claims 7-18 are new. Claims 5-6 are currently withdrawn from consideration.

New and Amended Claims

No new matter has been added. Exemplary citations of support for each of the elements of the new and amended claims is provided in the tables below.

Claims	Exemplary Citations
Claim 3. A method of manufacturing comprising:	*See, e.g.*, page 1, lines 5-6; page 5, lines 9-10.
fibrillating thermoplastic fibers and reinforcing fibers;	*See, e.g.*, page 5, lines 22-23; original claim 1, step one; page 20, lines 21-23.
combining the fibrillated thermoplastic fibers and reinforcing fibers to form combined fibers;	*See, e.g.*, original claim 1, step one.
dispersing and volatilizing the combined fibers to form a composite mat;	*See, e.g.*, original claim 1, step two.
needle-punching the composite mat, so that the two fibers are substantially uniformly distributed throughout the mat;	*See, e.g.*, original claim 1, step three; page 10, lines 23-25.
pre-heating the needle-punched composite mat;	*See, e.g.*, page 20, lines 10-11.
controllably applying pressure to the composite mat while heating the same so that melted matrix fiber impregnates the mat; and	*See, e.g.*, page 12, lines 3-5; page 13, lines 22-23; page 15, lines 9-15, 23-26; page 16, lines 13-15; Table I, page 16; page 20, lines 21-23; page 21, lines 20-21; Fig. 6.
continuing to apply pressure to the composite mat while cooling the same;	*See, e.g.*, page 20, line 26, to page 21, line 19.
wherein a pseudo-foamed composite sheet is formed by increased resilience of the reinforcing fiber due to entanglement of the mutually combined fibers.	*See, e.g.*, page 15, lines 26-30; page 18, lines 5-6; page 19, lines 18-23; page 20. lines 4-6.
Claim 4. The method as defined in claim 3, wherein the composite sheet is formed while being conveyed on a continuous belt.	*See, e.g.*, page 15, lines 23-30.
Claim 7. A method of manufacturing comprising:	*See, e.g.*, page 1, lines 5-6; page 5, lines 9-10.
fibrillating matrix fibers and reinforcing fibers;	*See, e.g.*, page 5, lines 22-23; original claim 1, step one; page 20, lines 21-23.
combining matrix fibers and reinforcing fibers to form combined fibers;	*See, e.g.*, original claim 1, step one.
matting the combined fibers to form	*See, e.g.*, page 5, lines 23-25; page 8, lines

a composite mat, such that the combined fibers in the composite mat are substantially randomly orientated;	18-20; page 9, lines 15-17; page 18, lines 26-29.
needle-punching the composite mat;	*See, e.g.*, original claim 1, step three.
pre-heating the needle-punched composite mat;	*See, e.g.*, page 20, lines 10-11.
compressing while heating the composite mat so that melted matrix fiber impregnates the mat; and	*See, e.g.*, page 12, lines 3-5; page 13, lines 22-23; page 15, lines 9-15, 23-26; page 16, lines 13-15; Table I, page 16; page 20, lines 21-23.
compressing while cooling the composite mat;	*See, e.g.*, page 20, line 26, to page 21, line 19.
wherein a pseudo-foamed, fiber-reinforced composite is formed.	*See, e.g.*, page 15, lines 26-30; page 18, lines 5-6; page 19, lines 18-23.
Claim 8. The method of Claim 7, further comprising laminating the pseudo-foamed, fiber-reinforced composite.	*See, e.g.*, page 5, lines 25-26; page 6, lines 6-8; page 14, lines 215-22.
Claim 9. The method of Claim 7, wherein the pre-heating or heating is performed by heating a belt used to transport the composite mat.	*See, e.g.*, page 15, lines 9-13.
Claim 10. The method of Claim 7 wherein the cooling of the composite mat comprises allowing the compressed composite mat to cool.	*See, e.g.*, page 21, lines 9-10, 13-14.
Claim 11. The method of Claim7 wherein the cooling of the composite mat occurs through air and water cooling.	*See, e.g.*, page 21, lines 1-10.
Claim 12. The method of Claim 7 wherein the reinforcing fibers have a high resiliency modulus.	*See, e.g.*, page 20, line 4.
Claim 13. The method of Claim 7 wherein the reinforcing fibers are inorganic.	*See, e.g.*, page 19, line 21.
Claim 14. The method of Claim 13 wherein the reinforcing fibers comprise 20-40 vol% or more of the composite mat.	*See, e.g.*, page 19, lines 21-22.
Claim 15. The method of Claim 7 wherein the reinforcing fibers are organic.	*See, e.g.*, page 19, line 22.
Claim 16. The method of Claim 15 wherein the reinforcing fibers comprise 30 vol% or more of the composite mat.	*See, e.g.*, page 19, lines 22-23.
Claim 17. The method of Claim 3 wherein the reinforcing fibers have a length of 30 mm or more.	*See, e.g.*, page 18, lines 15-17.

Claim 18. The method of Claim 3 wherein the reinforcing fibers have a length of 50 mm or more.	*See, e.g.*, page 18, lines 15-17.

Objections to the Specification

On page 3 of the Office Action, the Examiner alleges the following terms are not clear, concise and exact: "volatilizing" fibers; "pseudo-foamed composite sheet by inherent resilience of the fiber;" "webber;" "vibration strippers;" and "preheating" used to refer to steps performed at the end of the claimed process.

However, the statute makes clear that the purpose of the requirement that terms be clear, concise and exact is "to enable any person skilled in the art to which it pertain, or with which it is most nearly connected, to make and use the same. . . ." (*See* 35 U.S.C. §112, ¶1). In other words, the only requirement is that the terms be understandable to a person "skilled in the art." Applicants respectfully submit that each of the terms at issue already meets this standard, in that they are already understandable to the person skilled in the art, and that no amendment to the specification is necessary to further clarify the meaning of these terms to such a person. This is shown below for each of the terms at issue.

Regarding "volatilizing" fibers: At page 10, lines 6-7, the specification makes clear that "volatizing" is the function performed by a "webber machine": "[T]he ***webber machine*** 40 should be more efficient and suitable for production on a large scale, and should easily ***volatize*** the fibers." (emphasis added). One skilled in the art would understand that a webber machine is a machine that performs the "carding" process. (*See, e.g.*, USP No. 5,437,922, Col. 5, lines 22-26 ("The insulation microfibers, the staple fibers and the bonding fibers are blended together in a conventional carding machine or a similar machine, such as, a RANDO-WEBBER machine made by Rando Machine Corporation of Macedon, N.Y.")). Therefore, by virtue of the specification characterizing the function of a webber machine as "volatizing," one skilled in the art would understand that the specification equates the term "volatizing" with "carding." In a "carding" process, also known as combing, fibers are aligned and straightened, such as by the actions of a comb. (*See, e.g.*, Science and Technology Dictionary, defining "carding" as "[s]traightening or smoothing of raw fibers in a parallel fashion, with a

carding machine."). Since one skilled in the art would understand that "volatizing" means the same as "carding," no amendment to the specification is required to further clarify the term.

Regarding "pseudo-foamed composite sheet by inherent resilience of the fiber":

The specification, at page 15, lines 18-31, explains this term. In particular, this passage explains that the term "pseudo" means the foaming referred to is similar to the foaming that occurs in chemically foamed materials, but is different because here the foaming is attributable to the inherent resilience of the reinforcing fiber:

> Using resilience of the reinforcing fiber, the foamed fiber-reinforced composite may be manufactured. That is, the thermoplastic matrix fiber and the fiber reinforcement are combined and volatized in the matting cylinder to tangle two types of the fibers, whereby the oriented structure of the fibers in maintained in three-dimensional structure. The combined composite mat is fixed while being perforated by the distributed needles, and has a predetermined thickness. While the intervals between the rollers are gradually decreased, pressure applied to the continuous belt from the rollers is maintained. Thereby, the matrix resin is melted and impregnated in the composite mat. As such, when the pressure is instantaneously removed from the reinforcing fiber which is compressed to the belt, ***the tangled reinforcing fiber is foamed similarly to chemically foamed materials, attributable to inherent resilience of the reinforcing fiber, to manufacture the pseudo-foamed fiber-reinforced composite sheet.*** (Emphasis added).

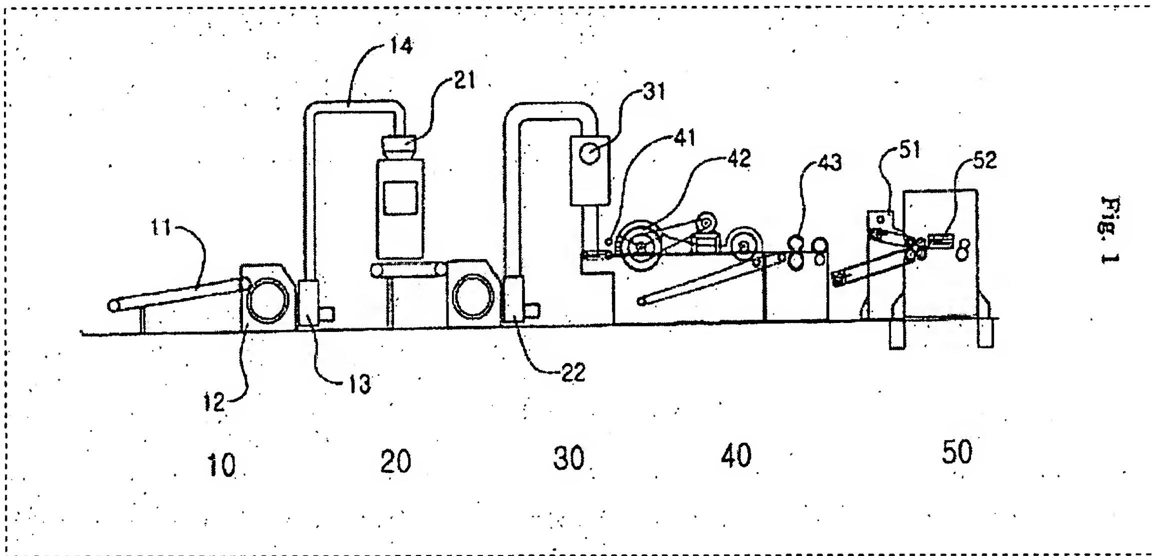
As the following passage, from page 20, lines 3-9, of the specification further explains, the increased resilience of the reinforcing fiber needed to induce pseudo-foaming is due to entanglement of the mutually combined fibers:

> For example, since resilience of polypropylene (PP) fiber is low and carbon fiber (CF) and glass fiber (GF) have high resilient modulus, ***entanglement of the mutually combined fibers leads to increased resilience required to foam the composite sheet.*** Upon preparation of the light adiabatic sheet foamed using organic reinforcing fiber, it is apparent that optimal sheet appearance is realized by foaming conditions and suitable amounts of the foaming agent such as the reinforcing fiber. (Emphasis added).

Therefore, one skilled in the art would understand what the Applicants meant by the term "pseudo-foamed composite sheet by inherent resilience of the fiber." No more is required.

Regarding "webber": As stated above, a webber machine is known in the art and carries out the carding process. (*See, e.g.*, USP No. 5,437,922, Col. 5, lines 22-26 ("The insulation microfibers, the staple fibers and the bonding fibers are blended together in a conventional carding machine or a similar machine, such as, a RANDO-WEBBER machine made by Rando Machine Corporation of Macedon, N.Y.")). Therefore, the term is understandable to one skilled in the art, and no more is required.

Regarding "vibration strippers": As the specification explains, element 31 in Figure 1 is an example of horizontal "vibration strippers:"



Page 8, line 30, to page 9, line 3, explains these strippers are situated on both sides of the upper end of the hopper of weighing machine 3 "[i]n order to increase dispersibility of the fibers and to prevent eccentricity thereof in a hopper of the weighing machine 30, strippers 31 are equipped to both sides of an upper end of the hopper having the sucked fibers. . . ." Page 9, lines 19-20, further explains that the function of these "vibration strippers" is to uniformly disperse fibers in the hopper: "In the composite mat feeding device, the conveyed fibers are uniformly dispersed in the hopper through horizontal vibration strippers 31."

Given that the specification describes how these strippers are situated in the apparatus of Figure 1, and also describes their function, the skilled artisan would understand the meaning of the term. Independent of the specification, the term would be understandable to one skilled in the art, as shown by the web site http://hotsearch.allproducts.com/product/Vibration_Stripper/, which lists several

manufacturers of vibration strippers in China and Taiwan. Therefore, since one skilled in the art would understand the term, the term is compliant with 35 U.S.C. §112, ¶1.

Regarding "preheating". The Examiner alleges that "preheating" is not clear, concise and exact because it used to refer to steps performed at the end of the claimed process rather than the beginning. However, that is incorrect because, as the following passage from page 13, lines 1-28, of the specification explains, the "pre" in "pre-heating" simply means the step is an initial heating step performed for a short time before a subsequent compressing step:

> ***For a more efficient molding process, the composite mat should be sufficiently preheated by the IR heating plate A210 before being subjected to the compressing process.*** Thereby, a short period of time required to heat the composite mat results in reduced tunnel length.
>
> * * *
>
> The dried composite mat having preheated thermoplastic fiber is passed through upper and lower conveying parts. . . . The rear portion of the composite mat is directly heated by the IR heater.
>
> * * *
>
> In the present invention, heating time of the IR heater is shortened through efficient energy management and continuous operation. (Emphasis added).

As further explained on page 20, lines 10-14, of the specification, this pre-heating step is beneficial because it facilitates pseudo-foaming:

> In order to perform the foaming process, the composite mat passed through the IR heater tunnels C140 should be sufficiently preheated up to the inside thereof. Upon the foaming process, the fibers are expanded and foamed by inherent resilience thereof. Thereby, the foamed cells have a small size, and uniform distribution thereof can be maintained.

Moreover, as the specification also explains at page 20, lines 15-25, omitting pre-heating is undesirable because, if pre-heating is omitted, the compression belt would have to be set to a relatively high temperature, but that would melt, degrade and thereby lower the strength of the matrix fiber:

> In case of not using the preheating process, the melting, heating and compressing processes of the composite mat are performed for a relatively long period of time. Thus, in order to increase the foaming efficiency, the compression belt should be set to a relatively high temperature. .When the surface temperature of the belt is increased, the carbon fiber and glass fiber combined with the polypropylene fiber are

> foamed by inherent resilience thereof, whereby the foaming process is naturally performed. However, since the polypropylene fiber as the matrix resin is processed to the temperature higher than the melting temperature thereof, it is deteriorated. Thus, strength of the matrix becomes low, and the resultant foamed composite sheet does not meet the demands for a desirable adiabatic sheet.

In other words, as can be seen by the foregoing, the usage of "pre-heating" here is similar to that in the following recipe for duck l'orange, which calls for pre-heating of the oven ***after*** many steps in the preparation of the duck, indicating that the "pre" in "pre-heating" simply means before the subsequent duck roasting step, not before all the duck preparation steps:

> Fill a large stockpot with 1 gallon of water. Add all the spices and honey to the water and bring to a boil over high heat.
>
> Meanwhile, stuff the cavity of each duck with 8 orange quarters. Truss the ducks and prick the entire surface of the skin with a fork, taking care not to puncture the flesh. Put the ducks into the pot and simmer for 12 minutes, placing a plate on top of the birds to keep them submerged. (If your pot is too small to hold both ducks, cook them one at a time.) Remove the ducks from the liquid, drain their cavities, and set them on a rack in a roasting pan to cool. Place them in the refrigerator, uncovered, to air-dry for 1 to 3 days.
>
> Preheat the oven to 350 degrees.
>
> Remove the ducks from the refrigerator and bring them to room temperature. Place in the oven and roast for 1 and 3/4 to 2 hours, until dark golden brown and crispy, with an internal temperature of 170 degrees. Remove from the oven and set aside to rest for 20 to 25 minutes before serving. If you need to crisp up the skin, place the ducks under the broiler for a minute or two. Serve with glazed turnips and braised mustard greens or turnip tops.
>
> Sauce for duck: Place the orange juice in a 2-quart saucepan and reduce by two thirds over medium heat, about 8 minutes. Add the veal stock, bay leaf, peppercorns, and thyme to the pan and reduce by half, about 10 minutes.
>
> Remove from heat and strain through a fine sieve. Whisk the butter into the sauce, and season to taste with salt.

So too here. The "pre" in "pre-heating" simply means before the subsequent compressing step, not before all the process steps, and one skilled in the art would understand that.

Claim Rejections – 35 U.S.C. § 112

On page 3 of the Office Action, the Examiner rejected Claims 1-4 under 35 U.S.C. 112, ¶2 for indefiniteness. In Claim 1, the Examiner objected to the preamble,

and the terms "volatizing the combined fibers," "to increase dispersibility," "maintain a coiled fiber shape and three-dimensional structure of the fiber of the mat," claiming their limiting effect was unclear and/or lack of recited manipulated steps. In Claim 2, the Examiner objected to the term "preheating." In Claim 3, the Examiner objected to "the compressing zone," alleging it lacks antecedent basis. In Claim 4, the Examiner objected to the lack of manipulative steps recited in the claim.

In response, Applicants have canceled Claims 1 and 2, and rewritten Claim 3 in independent form, while avoiding most of the offending terms and also sufficiently reciting manipulative steps in the rewritten claim. Regarding Claim 4, that claim depends from Claim 3, which recites the following manipulative steps that are incorporated into Claim 4:

> "pre-heating the needle-punched composite mat;
>
> controllably applying pressure to the composite mat while heating the same so that melted matrix fiber impregnates the mat; and
>
> continuing to apply pressure to the composite mat while cooling the same;
>
> wherein a pseudo-foamed composite sheet is formed by increased resilience of the reinforcing fiber due to entanglement of the mutually combined fibers."

Claim 4 has been amended to recite that "the composite sheet is formed ***while*** being conveyed on a continuous belt." One skilled in the art would understand that the manipulative steps recited in Claim 3 are responsible for forming the sheet, and that Claim 4 only requires that this forming occurs while the sheet is being conveyed on a belt.

Although the terms "volatizing" and "pre-heating" have been retained in Claim 3, these terms are proper, Applicant respectfully submits, because, as explained in the previous section, their meaning is understandable to one skilled in the art.

Based on the foregoing, Applicants respectfully submit that the indefiniteness rejection under 35 U.S.C. §112, ¶2 has been overcome.

Claim Rejections – 35 U.S.C. § 102

Re: Bastioli (U.S. Patent No. 5,145,626)

On page 4 and 5 of the Office Action, the Examiner rejected Claims 1-3 under 35 U.S.C. §102(b) for lack of novelty over Bastioli *et al.*, U.S. Patent 5,145,626; issued September 8, 1992 (hereinafter "Bastioli" or "the Bastioli patent").

In rejecting the claims, the Examiner considers that the Bastioli patent teaches "combining thermoplastic fiber and reinforcing fiber to form combined fibers," and also that "the recitation of 'thermoplastic fiber' is a broad term that is not defined in the specification to such a degree that it reasonably excludes thermoplastic polymer pellets as taught by Bastioli et al." (*See* Office Action, pages 2, 4-5). However, that is incorrect, because the specification specifically defines the term "thermoplastic fiber" to exclude thermoplastic polymer pellets such as disclosed by the Bastioli patent. Under controlling authority, Applicants' lexicography controls the meaning of this claim term. (*See, e.g., Phillips v. AWH Corp.*, 415 F.3d 1303, 1316, 75 USPQ2d 1321, 1329 (Fed. Cir. 2005) (en banc) ("[O]ur cases recognize that the specification may reveal a special definition given to a claim term by the patentee. . . . In such cases, the inventor's lexicography governs."), *cert. denied*, 126 S.Ct. 1332 (2006)). This principle applies during prosecution, as well as litigation, because the "broadest reasonable construction" that applies during prosecution must be "consistent with the specification," and here, the specification excludes such pellets from the term. (*In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364, 70 USPQ2d 1827, 1830 (Fed. Cir. 2004)). Even the MPEP mandates application of this principle during prosecution. (*See* MPEP §2111.01(III) ("Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim."). Therefore, it is incorrect to consider the term "thermoplastic fibers" to include the thermoplastic pellets of Bastioli because the specification implicitly and expressly defines the term to exclude such pellets.

More specifically, in the Background Art section of the specification, at page 2, lines 19-27, Applicants expressly distinguished prior art fiber-reinforced thermoplastic polymer (FRTP) composites, which combine reinforcing fibers with powder or pellet type thermoplastic resin, on the ground the pellets could easily separate from the fibers

during subsequent treatment processes, resulting in lack of even dispersion of the reinforcing fiber in the matrix resin, and resulting in end products lacking consistent quality and strength:

> "[T]he [prior art] FRTP composite should be prepared as a stampable planar sheet, suitable for use in the molding process of various molded articles. For this, typically, the reinforcing fiber is combined with powder or ***pellet*** type thermoplastic resin as a matrix resin, and heated and molded. But in such a case it is difficult to uniformly combine two materials due to their different material phases. As well, after being combined, the resin powders or pellets may be easily separated from the reinforcing fiber during a plurality of treatment processes. Thus the reinforcing fiber is not even dispersed in the matrix resin, whereby end products requiring consistent quality are hard to manufacture." (emphasis added).

Then, later in the Disclosure of the Invention section of the specification, the Applicants described how their invention is an improvement over the prior art because the invention combines thermoplastic fibers with reinforcing fibers. Page 5, lines 9-13 state "[t]herefore, it is an object of the present invention to provide a method of manufacturing a multifunctional fiber-reinforced composite through processes of heating and compressing or cooling of a composite mat obtained by ***uniformly combining ... at least two types of a thermoplastic resin fiber ... and a reinforcing fiber.***" (emphasis added). By criticizing the prior art based on its use of pellets, and lauding the advantages of the invention for its use of fibers, the Applicants implicitly defined the term "thermoplastic fiber" to exclude pellets.

But there is more. More specifically, in the Industrial Applicability section of the specification, the Applicants expressly defined the term "thermoplastic fiber" to exclude "powder or pellet type thermoplastic resin." Page 23, lines 18-20 state "[i]n the present invention, a thermoplastic fiber is used as a matrix of the composite, instead of powder or ***pellet*** type thermoplastic resin." (emphasis added).

In light of the foregoing, since the specification implicitly and expressly defines the term "thermoplastic fiber" as to exclude thermoplastic polymer pellets such as taught by Bastioli, and Bastioli only discloses combining a granulated thermoplastic polymer with a reinforcing fiber, and provides no hint of using a thermoplastic fiber in lieu of the

granulated thermoplastic polymer, Bastioli does not teach or suggest the following elements of Claim 3:

"fibrillating ***thermoplastic fibers*** and reinforcing fibers;

combining the fibrillated ***thermoplastic fibers*** and reinforcing fibers to form ***combined fibers***;

dispersing and volatilizing the combined fibers to form a composite mat;

. . . ." (Emphasis added).

Because the Bastioli process does not utilize two fibers, the composite materials that result from the Bastioli process are prone to the problems described at page 2, lines 19-27 of the specification, including separation between pellets and fibers, and end products of uneven strength and quality.

Accordingly, the lack of novelty rejection of Claim 3 should be withdrawn at least for this reason.

The lack of novelty rejection based on Bastioli should be withdrawn for the additional reason that Bastioli does not teach, describe or suggest pseudo-foaming, or hint at any recognition of the benefits of pseudo-foaming. Therefore, Bastioli fails to meet the following element of Claim 3:

"wherein a pseudo-foamed composite sheet is formed by increased resilience of the reinforcing fiber due to entanglement of the mutually combined fibers."

Moreover, because Bastioli does not use two fibers, it cannot be said that pseudo-foaming is inherent in the Bastioli process. As the following passage, from page 20, lines 3-9, of the specification explains, the pseudo-foaming occurs due to increased resilience of the reinforcing fiber due to entanglement of the mutually combined fibers:

> For example, since resilience of polypropylene (PP) fiber is low and carbon fiber (CF) and glass fiber (GF) have high resilient modulus, ***entanglement of the mutually combined fibers leads to increased resilience required to foam the composite sheet.*** Upon preparation of the light adiabatic sheet foamed using organic reinforcing fiber, it is apparent that optimal sheet appearance is realized by foaming conditions and suitable amounts of the foaming agent such as the reinforcing fiber. (Emphasis added).

Since the Bastioli process lacks two fibers, entanglement of mutually combined fibers does not occur in the Bastioli process. Therefore, the increased resilience of the

reinforcing fibers needed to induce pseudo-foaming, which occurs due to the entanglement of the mutually combined fibers, does not occur as well. Consequently, it cannot be said that pseudo-foaming is disclosed or inherent in Bastioli.

Bastioli therefore cannot be said to achieve the significant benefits offered by the pseudo-foaming of the subject invention such as providing a composite sheet or mat that has an excellent adiabatic property, *i.e.*, the ability to be formed without gain or loss of heat, that is lightweight, and that has a uniform size and distribution of foamed cells. (*See* spec., page 24, lines 17-20).

For this additional reason, the lack of novelty rejection of Claim 3 based on Bastioli should be withdrawn.

Re: Davies (U.S. Patent No. 6,881,288)

On page 5 of the Office Action, the Examiner rejected Claims 1-3 under 35 U.S.C. §102(e) for lack of novelty over Davies *et al.*, U.S. Patent No. 6,881,288, issued December 11, 2001 (hereinafter "Davies" or "the Davies patent"). The Applicants respectfully disagree.

Claim 3 recites, in part:

"fibrillating thermoplastic fibers and reinforcing fibers;

combining the fibrillated thermoplastic fibers and reinforcing fibers to form combined fibers;

dispersing and volatilizing the combined fibers to form a composite mat;

needle-punching the composite mat, so that the two fibers are substantially uniformly distributed throughout the mat;"

The combined effect of all these steps is to produce a composite mat where the two fibers are substantially uniformly distributed.

The Examiner considers that Col. 17, lines 21-25 and Col. 18, line 5-Col. 19, line 27 of Davies teaches these elements, but that is incorrect because these passages merely describe formation of a multi-layer structure, shown in Figure 10, reproduced below, wherein a layer of staple fibers 73, which the Examiner considers to be the claimed thermoplastic fibers, only partially entangle and engage the multiple layers of reinforcement fibers 71A, 71B, 71C, 71D.

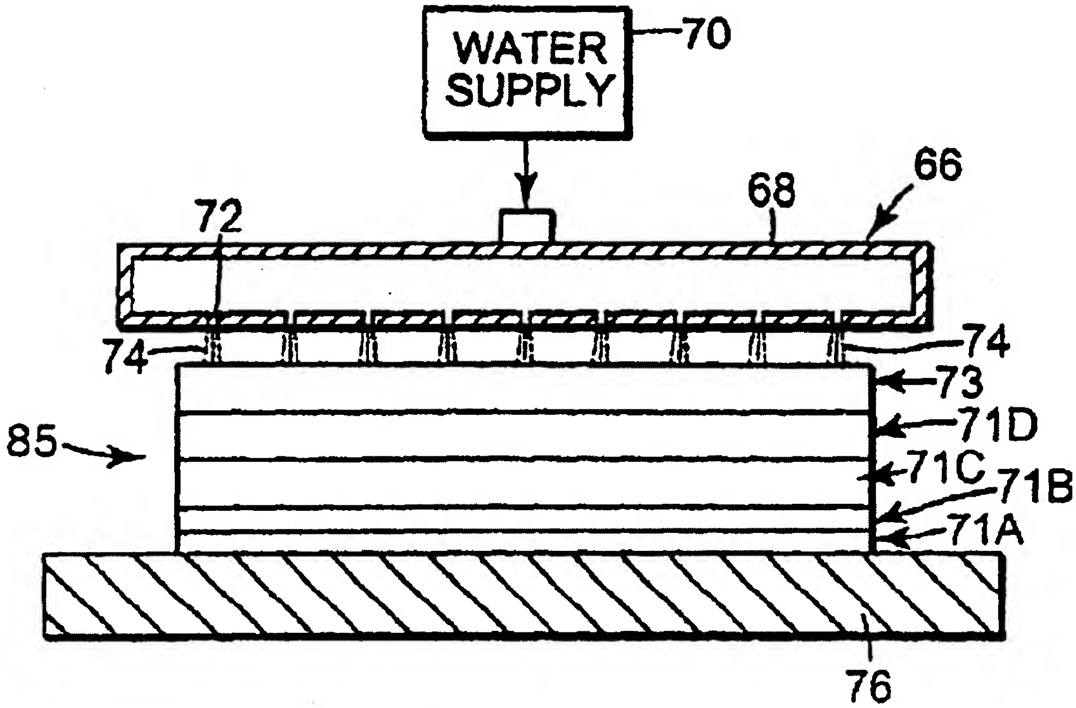


Fig. 10

Nothing indicates that the water jets 74, which are the disclosed mechanism for achieving the entangling in the structure of Figure 10 (*see* Col. 19, line 19), are capable of causing the staple fibers to be uniformly distributed throughout all the layers 71A, 71B, 71C, 71D, and it would not be reasonable to assume that this would occur, particularly since a uniform penetration of the stable fibers would not seem to be possible in Figure 10 given the angled relationship between the layers 71A, 71B , 71C and 71D, that is described at Col. 17, lines 26-39, of Davies, whereby the reinforcing fibers in layer 71B are at a 90° angle to the fibers in layer 71A, the fibers in layer 71C are at a 45° angle to the fibers in layer 71B, and the fibers in layer 71D are at a -45° angle to the fibers in layer 71C. The angled relationship between the fibers in these layers would seem to block the ability of the water jets 74 to substantially uniformly distribute the staple fibers throughout all the layers, particularly the layers below the surface layer, *i.e.*, layers 71A, 71B, 71C.

Although this structure can optionally be fed to the needler/perforator 108 of Figure 9, which the Examiner consider to meet the claimed needle punching step, Davies only indicates that this needler/perforator 108 forms an array of perforations in web 85, not that it substantially uniformly disperses the staple fiber within the multiple layers of reinforcing fiber. (*See* Col. 20, lines 8-21). It would not be reasonable to assume that this needler/perforator 108 achieves uniform distribution of the stable fibers within the multiple layers of reinforcing fibers, particularly since such a structure is nowhere described or illustrated in Davies. Consider, for example, Figure 8 of Davies, reproduced below, which seems to show the greatest dispersion of fibers in all the structures of Davies:

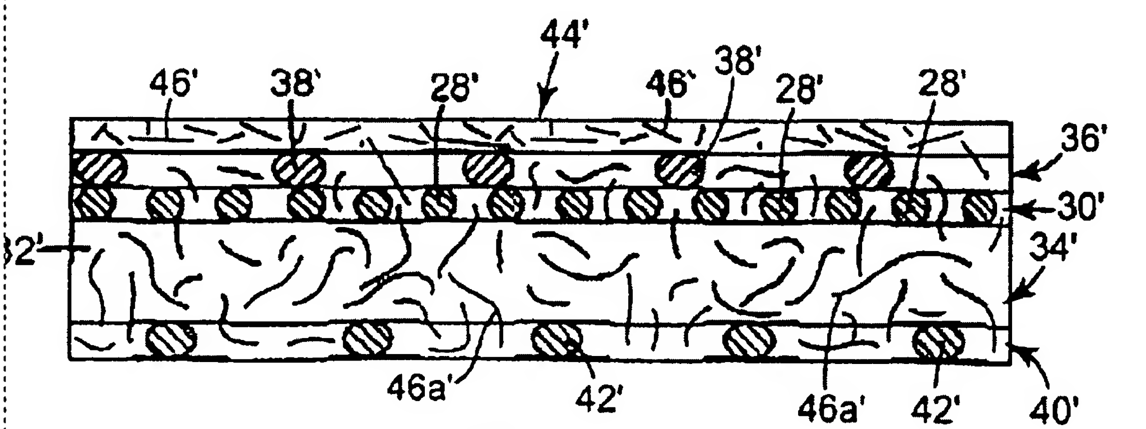


Fig. 8

But even in this structure, the fibers are far from being substantially uniformly distributed.

In light of the foregoing, the lack of novelty rejection of Claim 3 based on Davies should be withdrawn.

But that rejection should be withdrawn for the additional reason that Davies does not teach or suggest the following additional elements of Claim 3:

"pre-heating the needle-punched composite mat;

controllably applying pressure to the composite mat while heating the same so that melted matrix fiber impregnates the mat; and

continuing to apply pressure to the composite mat while cooling the same;

wherein a pseudo-foamed composite sheet is formed by increased resilience of the reinforcing fiber due to entanglement of the mutually combined fibers."

More specifically, in Claim 3, these steps all occur after needle-punching. Referring to Figure 9 of Davies, reproduced below, the Examiner considers the needle-punching step to be met by the needler/perforator 108:

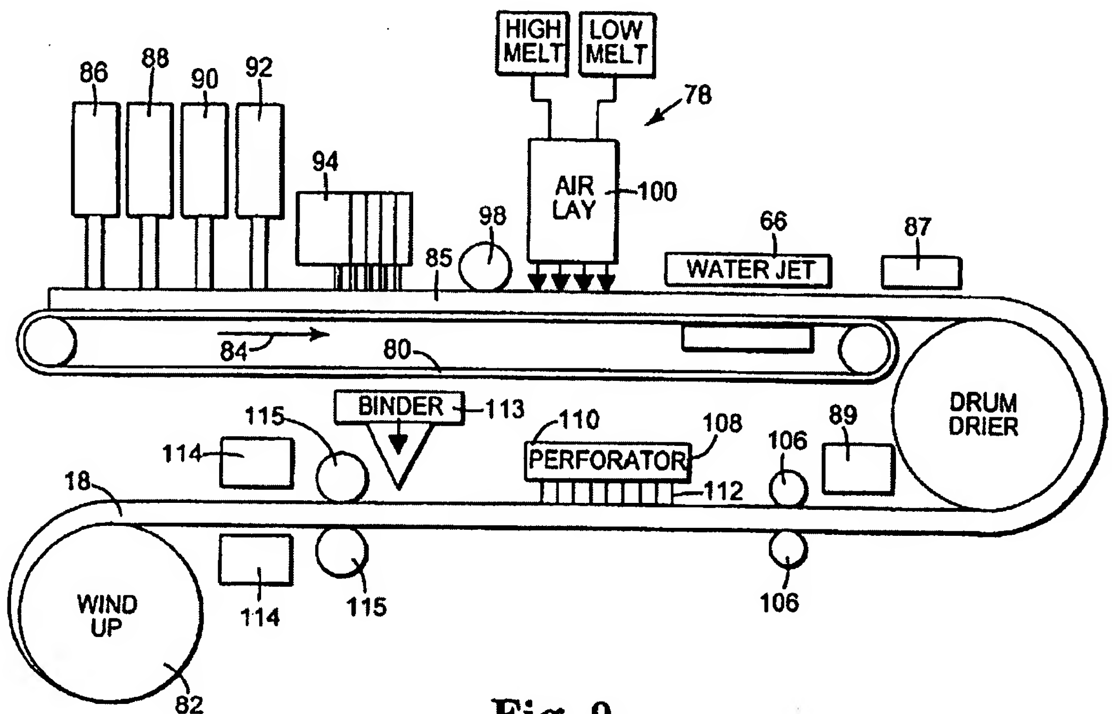


Fig. 9

The Examiner further considers the heating step to be performed by air drying oven 114, and the cooling step to be inherent in the removal of the mat from the proximity of the air drying oven 114. However, even assuming for the sake of argument that is so, there is nothing in Davies that performs the pre-heating, the controlled application of pressure while heating, the continued application of pressure while cooling, and the pseudo-foaming required by Claim 3.

For this additional reason, the lack of novelty rejection of Claim 3 based on Davies should be withdrawn.

Re: Kane (U.S. Patent No. 6,502,2890

On page 6 of the Office Action, the Examiner rejected Claims 1 and 2 for lack of novelty under 35 U.S.C. §102(e) based on Kane, *et al.,* U.S. Patent No. 6,502,289; issued August 4, 1999 (hereinafter "Kane" or "the Kane patent"). Although Applicants respectfully disagree with the Examiner's conclusions, as Claims 1 and 2 are cancelled; the rejection is moot. Moreover, based on Applicant's review of Kane, Kane is not applicable to Claim 3.

Claim Rejections – 35 U.S.C. §103

Claim 4 stands rejected for obviousness under 35 U.S.C. §103(a) based on Davies or Bastioli as applied to Claim 3 further in view of the Examiner's personal view that it would have been obvious to employ continuous stainless steel belts and magnet rollers in Davies or Bastioli. Although Applicant disagrees with the Examiner's conclusions, and reserves the right to request a personal affidavit from the Examiner to back up his personal views pursuant to 37 C.F.R. §1.104, for the reasons stated above, Claim 3 is patentable over Davies and Bastioli, considered singly or in combination. Therefore, Claim 4 is also patentable at least through its dependence upon an allowable base claim.

New Claims

New Claims 7-18 are patentable over Bastioli, Davies and Kane, considered singly or in combination.

In particular, none of these references teach, disclose or suggest pseudo-foaming or the significant benefits that accrue from pseudo-foaming, as detailed above. Nor is pseudo-foaming inherent in any of these references. At least for this reason, Claim 7 is patentable over these references, and Claims 8-16 are patentable over these references at least through their dependence, directly or indirectly, on Claim 7.

Regarding Claims 17-18, those claims are patentable over these references at least through their dependence on Claim 3.

Conclusion

For all the foregoing reasons, reconsideration of and withdrawal of all outstanding rejections is respectfully requested. The Examiner is earnestly solicited to allow all claims, and pass this application to issuance.

To expedite allowance of this case, the Examiner is earnestly invited to call Robert C. Laurenson at (949) 759-5269.

Respectfully submitted,

Date: April 16, 2007

/Robert C. Laurenson/
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